



652 Oliver Street
 Williamsport, PA. 17701 U.S.A.
 Telephone +1-877-839-7878 (U.S. and Canada)
 Telephone +1-570-323-7222 (International)
 Facsimile +1-570-327-7101
 Email Technicalsupport@lycoming.com
www.lycoming.com

SERVICE LETTER

Service Letter No. L282
 December 11, 2020

TO: Australian Robinson R22 and R44 Owners and Operators
 SUBJECT: Australian Fuel Testing

NOTICE: Incomplete review of all the information in this document can cause errors. Read the entire Service Letter to make sure you have a complete understanding of the requirements.

This Service Letter transmits information pertaining to recent engine testing performed on Avgas grades used in Australia and the United States.

A request was made by the Australian Civil Aviation Safety Authority (CASA) to Lycoming Engines to compare the operating characteristics of an O-360-J2A engine running on Avgas commercially available in Australia and the United States. Testing was completed with independent oversight provided by the Federal Aviation Administration (FAA) and included remote witnesses from the FAA and the Australian CASA.

Two blends of Avgas representing Avgas grades used in Australia were evaluated and compared to Avgas used in the United States. The fuels used in this test were Viva Energy Geelong 100LL (AU 100LL), Warter Fuels 100/130 (AU 100/130), and Phillips 66 Sweeny 100LL (US 100LL). While these fuels met the requirements of ASTM D910 or the equivalent UK Def Stan 91-090 specification, the detailed chemistry of the fuels, such as the aromatic content, is not directly controlled by the specifications. The AU 100LL, AU 100/130, and US 100LL fuels used in this test were sourced in early 2020 and had an aromatic content of 17.8%, 0.9%, and 14.0%, respectively.

During this test, direct switching between the various fuels was conducted while the engine was running at each operating condition. The engine transitioned between each fuel with no audible or visual variations. At each operating condition the observed brake horsepower and manifold pressure remained unchanged between fuels. Combustion characteristics including maximum cylinder pressure, cylinder pressure during maximum valve overlap, indicated mean effective pressure (IMEP), as well as the crank angle corresponding with maximum cylinder pressure, 10% mass fraction burn, 50% mass fraction burn, and 90% mass fraction burn showed negligible changes between fuels. During the test there were no indications of detonation or pre-ignition on any of the fuels and there was a negligible change in cylinder head temperature. There was a slight increase in exhaust gas temperature (EGT) when the engine was operating on fuels with a higher aromatic content. The EGT difference between AU 100LL and AU 100/130 was approximately 15°F. The EGT difference between AU 100LL and US 100LL was approximately 5°F. The higher aromatic content fuels also had a higher density which resulted in a proportional increase in mass fuel flow.

The results of the test showed negligible changes in engine operating characteristics between each fuel tested other than slight differences in exhaust gas temperature. There is no evidence that the differences in exhaust gas temperature exhibited during this test will have an impact on engine durability.

NOTICE: Refer to the latest revision of Lycoming Service Instruction No. SI 1070 and the aircraft manufacturer’s Pilot’s Operating Handbook (POH) for approved fuels and fuel grades. Follow the recommendations for engine cool-down before shut-down published in the Lycoming Operator’s Manual for your engine and the aircraft manufacturer’s POH or applicable service publications.



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